

## Research Article

## Integrative Smoking Cessation Stage Model for Chinese Students Studying in Korea

Hyunsoo Oh, PhD, RN,<sup>1</sup> Hyesun Jeong, PhD, RN,<sup>2</sup> Whasook Seo, PhD, RN<sup>1,\*</sup><sup>1</sup> Department of Nursing, Inha University, Incheon, South Korea<sup>2</sup> Department of Nursing, Cheongju University, Cheongju, South Korea

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## SUMMARY

**Purpose:** The present study aimed at developing an integrative stage model of smoking cessation behavior by combining highly predictable constructs extracted from previously verified health behavior models. The fitness of the hypothetical model was also tested.

**Methods:** The study participants were 214 Chinese students studying in Korea, presenting high smoking rates. Perceived severity, benefit, barrier, self-efficacy, and social support were measured using the modified Attitudes–Social Influences–Self Efficacy Questionnaire. Demographic and smoking-related characteristics were also evaluated.

**Results:** Results showed that the hypothetical model provides a good fit. Significant psychosocial predictors of smoking cessation stage were perceived benefit ( $p = .050$ ), barrier ( $p = .003$ ), and social support ( $p = .003$ ). Among demographic and smoking-related characteristics, gender ( $p = .030$ ), duration of smoking ( $p = .010$ ), and previous smoking cessation experience ( $p = .020$ ) were found to influence smoking cessation stage. In addition, gender, age, number of cigarettes smoked, previous smoking cessation experience, smoking-related symptoms, and smoking cessation education needs were found to influence psychosocial constructs significantly.

**Conclusion:** The significant psychosocial predictors and demographic and smoking-related characteristics defined in the present study appear to be potent and promising predictors of smoking cessation behavior stages for a cohort of Chinese students studying in Korea.

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## Introduction

In 2010, 87,480 foreign students studied in Korean colleges or universities and 63,676 of these (79.6%) were Chinese (Korea Immigration Office, 2011). International students encounter problems related to language, study pressure, and the cultural environment, which may lead to harmful health behaviors, such as smoking or drinking (Koyung, 2010; Lim & Han, 2009). The Chinese smoking population is almost 300 million or one fourth of the global smoking population (MBC News, 2011). In 2011, Song (2011) reported that 39.1% of Chinese students studying in Korea are nicotine addicted.

Smoking increases the risks of cardiovascular, respiratory, gastrointestinal, and reproductive diseases (Gellert, Schöttker, & Brenner, 2012), and many cancers (Touvier et al., 2013). Furthermore, nicotine is highly addictive (Schnoll, Goren, Annunziata, &

Suaya, 2013). Investigators have found that smoking cessation markedly reduces the risks of developing many diseases including lung cancer, and that smokers can totally reverse damage by giving up smoking (Korean Society for Health Promotion and Disease Prevention, 2012). Therefore, it is important that smokers are made aware of the risks posed by smoking and of the benefits of smoking cessation. Furthermore, long-term smokers find it harder to quit smoking. Thus, smoking cessation programs targeting young adults reduce the long-term consequences of smoking and are more successful than those targeting older age groups.

In general, the final goal of smoking management is to have individuals stop smoking completely. However, for those with no intention of stopping, the goal of a smoking cessation program should be to make them aware of the need to quit smoking and to prepare them to move from a state of precontemplation to one of activity (Prochaska, DiClemente, & Norcross, 1992). Prochaska et al. presented the stages of behavioral change and representative examples of specific strategies for each stage.

Various theoretical models, such as the Health Belief Model (Becker, 1974), the Theory of Reasoned Action (Fishbein & Ajzen, 1975), the Theories of Planned Behavior (Ajzen & Madden, 1986),

\* Correspondence to: Whasook Seo, PhD, RN, Department of Nursing, Inha University, 253 Yonghyun-dong, Nam-gu, Incheon 402-751, South Korea.

E-mail address: [wschang@inha.ac.kr](mailto:wschang@inha.ac.kr)

and the Social Cognitive Theory (Bandura, 2000) have been developed to illustrate health-related behaviors. In addition, researchers have made great efforts to clarify which models or combinations of model constructs most usefully describe health-related behaviors (Noar & Zimmerman, 2005). However, Nigg and Jordan (2005) have suggested that these models may not provide a complete picture of health behaviors. Based on such considerations, researchers have proposed that more effort is needed for developing integrative models by combining highly explicable constructs extracted from previously verified models (Reid & Aiken, 2011). It is generally accepted that an integrative model consisting of the powerful predictors of health behavior may provide a more complete understanding of the property of health behavior (Baranowski, 2005).

Even before this opinion was widespread, Dejoy (1996) developed an integrative health protective behavior model based on the Health Belief Model, the Theory of Reasoned Action, the Theories of Planned Behavior, and the Transtheoretical Model (TTM). Recently, Reid and Aiken (2011) developed an integrated model by combining the five health behavior models to illustrate condom use. The present study aimed to develop an integrative model of smoking cessation behavior. The major constructors included in the model are perceived severity, benefit, barrier, self-efficacy, and social support, which have been verified as significant predictors of various types of health behaviors (Dejoy; Kim, Oh, Ham, Jung, & Seo, 2010; Reid & Aiken).

### Theoretical background

Value-expectancy models, the TTM, and the Health Promotion Model are the most frequently adopted to illustrate health behaviors (Reid & Aiken, 2011). Value-expectancy models, such as the Health Belief Model, the Theory of Reasoned Action, and Protection–Motivation Theory are different from one another, but they all emphasize threat-related belief (Dejoy, 1996). The Health Belief Model shows that threat-related belief (perceived sensitivity & severity), perceived benefit and barrier are the major determinants of health behavior performance (Reid & Aiken). The Theory of Reasoned Action purports that behavioral changes can be

significantly affected by normative expectations about related behaviors, particularly the subjective norm of those important to the individual (Ozakan, Lajunen, Dogruyol, Yildirim, & Coymak, 2012). Protection–Motivation Theory, an expanded Health Belief Model, indicates that self-efficacy is a major determinant of health behavior (Ben-Ami, Shaham, Rabin, Melzer, & Ribak, 2001). On the other hand, the Health Promotion Model proposes cognition–perception, emotion and personal relationship factors as the major determinants of health behavior and that an individual's characteristics and related previous experience possibly contribute to health behavior (Pender, Murdaugh, & Parsons, 2002).

The TTM focuses on the process of behavior change, a model frequently adopted to illustrate smoking cessation behavior. The model consists of five behavior change stages, these are precontemplation, contemplation, preparation, action, and maintenance (Prochaska et al., 1992). In terms of smoking cessation behavior, the precontemplation stage is the stage at which the individual has no intention to quit smoking in the near future, whereas the contemplation stage is the stage of having the intention to take action within the next 6 months. The preparation stage is the stage of having the intention to take action within the next 30 days. The action stage is that in which smokers modify behavior to quit smoking, and the maintenance stage involves the continuation of smoking cessation for more than 6 months.

Investigators have shown that generally integrative models explain health behavior better than any single model/theory (Reid & Aiken, 2011). In the present study, an integrative model of the stages of smoking cessation was developed based on the TTM, the Health Belief Model, the Theory of Reasoned Action, the Prediction–Motivation Theory, and the Health Promotion Model (Figure 1). The study model consists of four stages (the precontemplation, contemplation, action, & maintenance stage) as defined in the TTM and the five constructs (perceived severity, benefit, barrier, self-efficacy, & social support) as defined in the Health Belief Model, the Theory of Reasoned Action, and the Prediction–Motivation Theory. In addition, demographic and smoking-related characteristics are also included as model components as used in the Health Promotion Model (Pender et al., 2002).

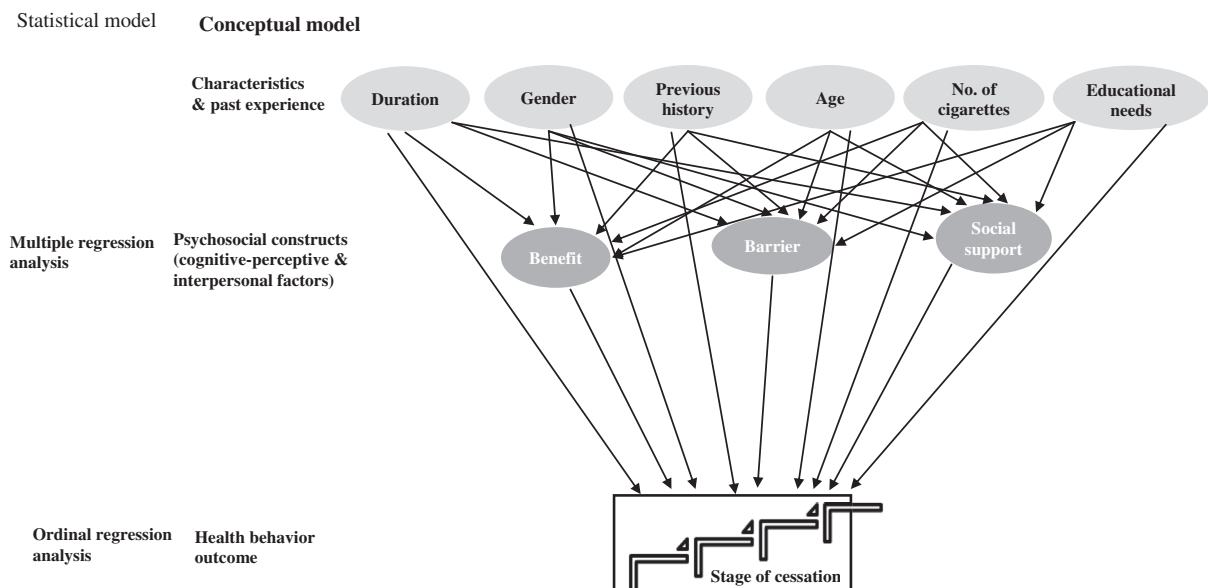


Figure 1. Integrative conceptual and statistical model for smoking cessation.

### Study purpose

The present study aimed to develop an integrative smoking cessation stage model by combining highly predictive constructs extracted from previously verified health behavior models. The fitness of the model was also tested. Specific study aims were (a) to determine the influences of model constructs (psychosocial factors), and demographic and smoking-related characteristics on smoking cessation behavior, and (b) to determine the influences of demographic and smoking-related characteristics on the psychosocial factors of smoking cessation.

### Methods

#### Study design

The present study adopted a nonexperimental and correlational research design to develop and test an integrative smoking cessation stage model.

#### Setting and sample

Participants were 214 Chinese students studying in Korea. They were recruited from a university language school located in Chung-Cheong province, South Korea. Convenient and snowball sampling method was used. Only participants who understood the study purpose and consented to participate were recruited. The sample size of 214 participants was considered adequate based on the standards of power analysis (Cohen, 1988). According to power analysis conducted using the G\*power 3.1 program (Faul, Erdfelder, Buchner, & Lang, 2009), the minimum sample size required in the present study was 161 (Cronbach's  $\alpha = .05$ , effect size = .12, power  $(1 - \beta) = .80$ , no. of predictable variables = 13). The effect size (.12) was derived from Kim's study (1999) in which a smoking cessation stage model was examined in Korean college students; this was because no related study had been previously conducted on Chinese students studying in Korea. Although the minimum sample size required was 161, we collected data from 214 participants based on the expectation of missing data or erratic responses.

#### Ethical consideration

This study was approved by the human research committee of a university hospital in Incheon, South Korea (institutional review board no.: Academic 12-77). It was made clear to all participants that they were free to withdraw from the study at any time without penalty. The study purposes and procedures were explained and students were then allowed to decide whether to participate in the study or not. Informed consent was obtained from all those who agreed to participate.

#### Measurements

##### Demographic and smoking-related characteristics

To enable the analysis of demographic and smoking-related characteristics, eight items were added to the questionnaire for information concerning age, gender, stress level, number of cigarette per day, smoking duration, smoking symptoms, previous experience of smoking cessation, and smoking cessation education needs. Stress level was measured using a one-item visual analog scale. Respondents marked a point corresponding to the degree of stress they perceived recently between 0 (*no stress*) and 100 (*maximum stress*). Smoking symptoms were assessed using a seven-item, 4-point scale (1 = *never*, 2 = *sometimes*, 3 = *often*, 4 = *always*). Cough, dyspnea, sore throat, fatigue, decreased

appetite, sputum, and chest pain were included as smoking symptoms based on the literature. Smoking cessation education needs were evaluated using a one-item, 5-point scale. Respondents were asked to select one from five different degrees of educational needs for smoking cessation (1 = *no need at all*, 5 = *need very much*).

#### Stages of smoking cessation

Smoking cessation behavior changes were classified into four stages as described by Prochaska et al. (1992): (a) the precontemplation stage (no intention to quit smoking in the near future), (b) the contemplation stage (the preparatory stage prior to smoking cessation), (c) the action stage (a stage in which smokers modify behavior to quit smoking), and (d) the maintenance stage (the continuation of not smoking for more than 6 months). Respondents were asked "At what stage of smoking cessation are you at this time?" Short explanations for each stage were also provided.

The TTM originally used five stages (precontemplation, contemplation, preparation, action, & maintenance) to illustrate behavioral changes (Prochaska et al., 1992). After careful consideration of the five stages of TTM, we recognized that some attributes were found to overlap between the contemplation stage and the preparation stage in terms of having a plan to quit smoking in the near future, gathering information, and starting to look at smoking cessation strategies. Therefore, these two were combined in the present study.

#### Psychosocial constructs

Perceived benefit, barrier, self-efficacy, and social support were measured using the modified Attitudes–Social Influences–Efficacy (ASE) Questionnaire which was originally developed for smokers (De Vries, Backbier, & Kok, 1994). The validity and reliability of the original English version of the ASE has been confirmed in several European countries (De Vries et al.). Markham et al. (2009) also confirmed the reliability and validity of the ASE.

In the present study, ASE was translated and modified by adding several new items based on theoretical and operational definitions of psychosocial constructs presented in the Health Belief Model, the Prediction–Motivation Theory, and the Health Promotion Model. The content and face validity of the modified ASE were thoroughly examined and then verified by confirming correspondences between items and conceptual and operational definitions. A content validity index (CVI) was computed for each item using a 4-point scale (*not valid at all*, *less valid*, *valid*, & *highly valid*). Items with a low CVI were modified with the aid of an expert panel consisted of three nursing professors.

In addition, construct validity of the modified ASE were also examined because several new items were added in the present study. Construct validity was assessed in 30 Chinese students using a known group validity test and nomological validity (or logical validity) test. The known group validity test is a typical method that evaluates construct validity and is used when a test can discriminate between a group of individuals with a particular characteristic being measured and a group without (Polit & Hungler, 1999). Based on the empirical study (Chang, Kim, Kil, Seomun, & Lee, 2005; Gaffney, Eichakbum, & Dawson, 2002; Grimshaw & Stanton, 2006), findings that the psychosocial constructs included in the present study are significantly affected by previous smoking cessation experience; the known group validity was tested by examining significant differences in the psychosocial constructs between those with previous smoking cessation experience and those without. Our results showed that there were significant differences in perceived benefit, barrier, self-efficacy, and social support between those with previous smoking cessation experience ( $n = 18$ ) and those without ( $n = 12$ ).

Nomological validity is also a form of construct validity and refers to the ability of a measure of the construct to predict measures of other constructs embedded in a theoretical network of relationships (Grawitch, Maloney, Barber, & Moosheqian, 2013). In the present study, the nomological validity was examined in 30 Chinese students and was well supported by significant interrelationships among perceived severity, benefit, barrier, self-efficacy, and social support. A pretest was also performed in 30 Chinese students to identify any potential problems with the items and to ensure that the questionnaire is understandable and meets the study purpose.

Regarding the translation procedure, ASE was translated into Korean by the first author of the present study. To verify the validity of the translation, the coauthors confirmed whether individual items of the translated ASE had the same meaning as the original items in English. In addition, the translated ASE was modified by adding several new items. Then the modified ASE was translated to Chinese by a professional translator. Two Chinese students fluent in Korean reviewed the Chinese translation and confirmed whether individual items were accurately translated.

**Perceived benefit.** The original version of the ASE questionnaire includes seven items that assess the extents to which the perceived disadvantages of smoking have on physical health. In the present study, the items were converted to questions addressing benefits of smoking cessation. In addition, five questions regarding perceived benefits of smoking cessation with respect to psychosocial aspects of health were added. Finally, perceived benefit of smoking cessation was measured using a 12-item, 5-point scale, where higher scores represented higher levels of perceived benefit. The validity was examined using face validity, CVI, and construct validity (known group validity or nomological validity). CVI scores ranged from .88 to .92 and Cronbach's alpha was .97.

**Perceived barrier.** ASE assesses the benefits of smoking and barriers to smoking cessation due to nicotine dependency. Benefits of smoking can be interpreted as barriers to smoking cessation. Therefore, in the present study, the items of smoking benefits in the ASE questionnaire were converted to questions addressing barriers to smoking cessation. In addition, new items were added to determine the extent of barriers related to lack of information, surrounding conditions, and fears of weight gain. Accordingly, the perceived barrier to smoking cessation was measured using a 10-item, 5-point scale, where higher scores represent greater barriers to smoking cessation. Validity was examined using face validity, CVI, and construct validity (known group validity or nomological validity). CVI scores ranged from .89 to .94 and Cronbach's alpha was .91.

**Self-efficacy.** The ASE questionnaire includes five items evaluating the extent of self-efficacy to resist smoking temptations from important acquaintances. In addition, five items that measure self-confidence or belief in knowledge, skill, and other techniques required to quit smoking were added based on operational definitions proposed in Planned Behavior Theory, Social Cognitive Theory, and Health Promotion Model. Then, the 5-point Likert scale (0–5 point) was converted to a visual analogue scale (0–100 point). Finally, self-efficacy on smoking cessation was measured using a 10-item visual analogue scale in the present study. The validity was examined using face validity, CVI, and construct validity (known group validity or nomological validity). CVI scores ranged from .91 to .95 and Cronbach's alpha was .88.

**Social support.** Seven items of the ASE questionnaire were used in the present study. These items assess the extent of influences, pressure, and support related to smoking cessation from family and friends. Higher scores represent higher levels of perceived social support. Validity was examined using face validity, CVI, and construct validity (known group validity or

nomological validity). CVI scores ranged from .88 to .91 and Cronbach's alpha was .79.

**Perceived severity.** Perceived severity refers to the seriousness with which the individual perceives a related health problem or negative outcomes resulted from unhealthy behaviors (Noar & Zimmerman, 2005; Pender, Murdaugh, & Parsons, 2011). Based on this definition, a seven-item, 5-point scale of perceived severity was developed in the present study. This scale assesses the perceived severities of the negative effects of smoking with respect to studies, future plans, family, financial burden, and social life. Higher scores represent higher levels of perceived severity. Validity was examined using face validity, CVI, and construct validity (known group validity or nomological validity). CVI scores ranged from .90 to .94 and Cronbach's alpha was .89. Then the questionnaire was translated into Chinese by a professional translator. Two Chinese students fluent in Korean reviewed the Chinese translation and confirmed whether individual items were accurately translated or not.

#### Data collection

Two Chinese students fluent in Korean, who did not otherwise participate in the study, were educated with respect to the purposes and procedures of the present study. They assisted with data collection. The author directly contacted potential participants with the aid of these two research assistants at popular smoking places in the university language school where our participants were enrolled. Initially contacted participants then recruited others from among friends and classmates. Data were obtained mainly using a self-reported questionnaire. Interview was also conducted for the participants who had difficulties with the questionnaire. Questionnaires were completed and interviews were conducted in the student lounge of the language school or in nearby coffee shops. In general, the questionnaire took 10–15 minutes to complete. Small gifts of stationery were rewarded to participants who completed the questionnaire. In the present study, all information was collected anonymously using number codes. Data are presented as mean values, not as individuals' values.

#### Data analysis

Statistical analysis was performed using SPSS 19/PC (SPSS Inc., Chicago, IL, USA). Descriptive analysis was used to determine general participant characteristics. Multivariate regression and ordinal regression were conducted to verify the fitness of the hypothetical model. Multivariate regression analysis was used for continuous dependent variables whereas ordinal regression was used for ordinal dependent variables on either continuous or categorical independent variables.

The ordinal regression model includes three major components: local components, scale components and a link function. Location components are portions of the equation that include coefficient and independent variables such as  $\beta_1X_1 + \beta_2X_2 + \dots + \beta_kX_k$ . Scale components account for the differences in variability for different values of independent variables. The link function is a transformation of the cumulative probabilities that allow estimation of the model. Available link functions are the logit function (for equal categories), the probit model (for normally distributed dependent variables), the negative log-log (for high probability of the lower category), the complementary log-log (for high probability of the higher category), and the cauchit (for the presence of extreme values; SPSS Korea Consulting Team, 2011).

Like general regression analysis, ordinal regression allows model fitness and the significance of predictors to be determined. Ordinal regression evaluates model fitness using model fitness



**Table 1** Model Fitness and Influencing Factor ( $N = 214$ )

Significant factors of smoking cessation stage			
Variables	B	Wald	p
Benefit	.02	3.64	.050
Barrier	−.05	9.00	.003
Social support	.10	8.80	.003
Duration of smoking	−.02	6.58	.010
Previous smoking cessation experience: Yes	.66	5.91	.020
Gender: Male	−.64	4.76	.030
Fitness test of the model			
Indicators	$\chi^2$	p	
Model fitness information	44.66	<.001	
Goodness of fit	329.18	.595	
Test of parallel lines	13.30	.348	
Pseudo R <sup>2</sup>	Nagelkerke: .28		

information, goodness of fit, test of parallel lines (TPL), and pseudo  $R^2$  instead of  $F$  and  $p$  values as used in general regression analysis. To identify significant predictors, we used  $\beta$  estimates,  $t$  and  $p$  values.

Although structural equation model is more powerful for analyzing the interrelationships among variables, multiple regression analysis was used in the present study because the major dependent variable was the ordinal type of data (stages of smoking cessation). Specifically, ordinal regression was used for predicting ordinal dependent variable, while linear regression was used for interval dependent variables. The statistical methodology used in the present study was checked by an expert in statistics.

## Results

### Descriptive statistics for participant characteristics and major variables

In the present study, 214 Chinese students studying in Korea were included. Mean participant age was 22.07 ( $\pm 2.19$ ) years. 65 (30.4%) participants were female and 149 (69.6%) were male. Most participants were single ( $n = 201$ , 93.9%).

The mean perceived stress score of the study participants was 49.32 ( $\pm 21.60$ ). Mean number of cigarettes smoked per day was 22.07 ( $\pm 2.18$ ) and the mean duration of smoking was 15.23 ( $\pm 10.12$ ) months. Of the 214 participants, 176 (82.2%) had family members and 133 (62.1%) had friends who smoked. Regarding reasons for smoking, 105 (49.1%) smoked to relieve stress and 81 (37.9%) smoked habitually. Other reasons (13%) for smoking were curiosity, the influences of friends and peers, looking cool, and

weight control. The mean perceived smoking-related symptom score was 12.05 ( $\pm 3.08$ , range: 7–28), indicating a medium level.

In terms of stages of smoking cessation behavior, 61.2% ( $n = 131$ ) of the participants were found to be in the contemplation stage, 22.3% in the precontemplation stage, and 16.5% in the action stage. Most ( $n = 145$ , 68.4%) had previous experience of smoking cessation. In addition, 112 (53.0%) expressed the need for a smoking cessation education program. Mean scores were 18.36  $\pm$  6.32 (range: 7–35) for perceived severity, 42.25  $\pm$  13.72 (range: 12–60) for benefit, 26.07  $\pm$  8.61 (range: 10–50) for barrier, 532.50  $\pm$  173.01 (range: 0–900) for self-efficacy, and 23.81  $\pm$  4.80 (range: 7–35) for social support.

### Fitness of the hypothetical model and significant factors

To test the fitness of the hypothetical model (Figure 1), ordinal regression was conducted. Various indicators such as model fitness information, goodness of fit, TPL, and pseudo  $R^2$ , were computed to verify fitness. Overall, these fit indicators showed a good fit for the hypothetical model (model fitness information:  $\chi^2 = 44.66$ ,  $p < .001$ ; goodness of fit:  $\chi^2 = 329.18$ ,  $p = .595$ ; pseudo  $R^2 = .28$ ). The pseudo  $R^2$  of .28 indicates an explicability of 28% for the hypothetical model. Although TPL showed that the model was unfit, TPL results can be meaningless when there are many continual independent variables in a model, as is the case for the hypothetical model of the present study.

The significant psychosocial predictors of smoking cessation behavior stage were perceived benefit ( $\beta = -.02$ ,  $p = .050$ ), barrier ( $\beta = -.05$ ,  $p = .003$ ), and social support ( $\beta = .10$ ,  $p = .003$ ) (Table 1). This suggested that participants with a higher level of perceived benefit and social support and a lower barrier were more likely to be at a more advanced stage of smoking cessation behavior. Of these significant factors, the most influential factor was social support. Perceived severity and self-efficacy were not found to be significant factors of smoking cessation behavior in the present study.

Of the demographic and smoking-related characteristics, gender ( $\beta = -.64$ ,  $p = .030$ ), smoking duration ( $\beta = -.02$ ,  $p = .010$ ), and previous experience of smoking cessation ( $\beta = .66$ ,  $p = .020$ ) (Table 1) were found to be significant predictors of smoking cessation behavior. This suggested that participants who were male, had smoked for a short time, and had previous smoking cessation experience were more likely to be at a more advanced stage of smoking cessation behavior. The present study shows that demographic and smoking-related characteristic factors are more likely to affect smoking cessation behavior than psychosocial factors are. In particular, previous experience of smoking cessation and gender were found to be the most significant factors.

**Table 2** Effects of Demographic and Smoking-related Characteristics on Psychosocial Factors of Smoking Cessation Behavior ( $N = 214$ )

Variables	Predictors	$\beta$	$t(p)$	Adjusted $R^2$	$F(p)$
Severity	Gender	.27	3.62 (<.001)	.17	5.62 (<.001)
	Smoking cessation education needs	.19	2.73 (.007)		
	Smoking-related symptoms	.17	2.26 (.025)		
Benefit	Age (yr)	.31	4.32 (<.001)	.14	4.82 (<.001)
	No. of cigarettes smoked	-.15	-2.02 (.044)		
	Previous experience of smoking cessation	.19	2.64 (.009)		
Barrier	Previous experience of smoking cessation	-.18	-2.48 (.014)	.08	3.09 (.003)
	No. of cigarettes smoked	-.30	-4.15 (<.001)		
Self-efficacy	Age	.15	2.16 (.032)	.12	4.13 (<.001)
	Smoking cessation education needs	.21	2.95 (.004)		
	Previous experience of smoking cessation	.20	2.78 (.006)		
Social support	Age	.15	2.16 (.032)	.16	5.45 (<.001)
	Smoking cessation education needs	.21	2.95 (.004)		

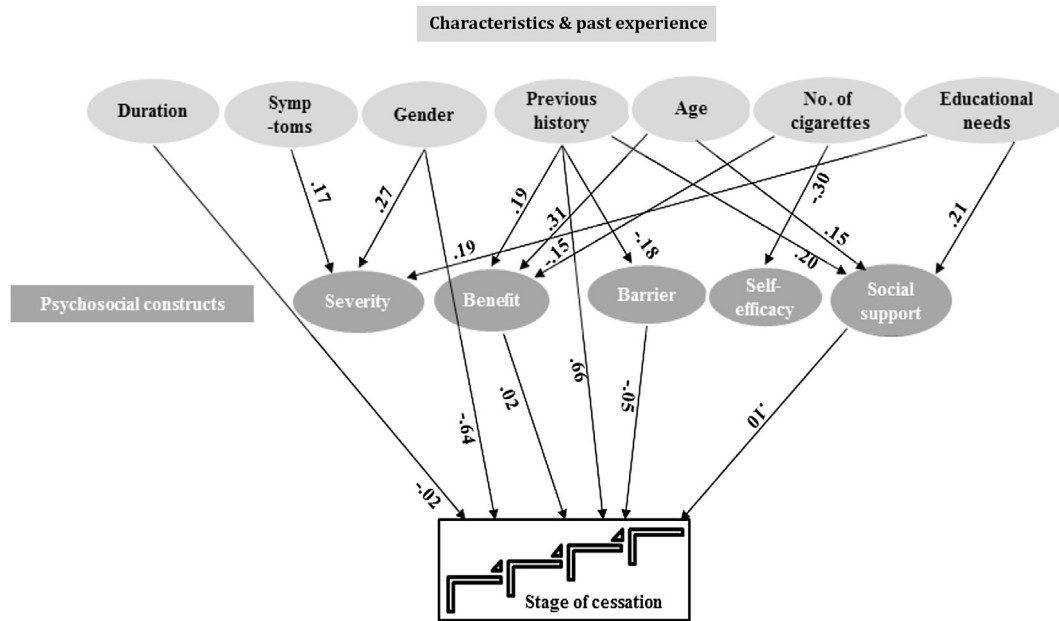


Figure 2. Significant influencing factors for smoking cessation stage.

#### Influences of demographic and smoking-related characteristics on psychosocial factors

To determine the influences of demographic and smoking-related characteristics on psychosocial factors, multivariate regression analysis was conducted. The results obtained showed that gender ( $\beta = .27, t = 3.62, p < .001$ ) smoking cessation education needs ( $\beta = .19, t = 2.73, p = .007$ ), and smoking-related symptoms ( $\beta = .17, t = 2.26, p = .025$ ) significantly affected perceived severity with an explicability of 17% (adjusted  $R^2 = .17, F = 5.62, p < .001$ ) (Table 2). Participants who were female, felt more needs for smoking cessation education, and those with more smoking-related symptoms were more likely to have a higher level of perceived severity. Gender was the most significant factor that explained perceived severity.

For perceived benefits of smoking cessation, age ( $\beta = .31, t = 4.32, p < .001$ ), number of cigarettes smoked ( $\beta = -.15, t = -2.02, p = .044$ ), and previous smoking cessation experience ( $\beta = .19, t = 2.64, p = .009$ ) (Table 2) were identified as influential factors with an explicability of 14% (adjusted  $R^2 = .14, F = 4.82, p < .001$ ). Participants who were older, smoked fewer cigarettes, and with previous smoking cessation experience seemed to have a higher level of perceived benefit. Age was the factor that most influenced perceived benefit.

Regarding perceived barrier to smoking cessation behavior, the only significant factor identified was previous smoking cessation experience ( $\beta = -.18, t = -2.48, p = .014$ ) with an explicability of 8% (adjusted  $R^2 = .08, F = 3.09, p = .003$ ), indicating that participants with previous smoking cessation experience had a lower level of perceived barrier. With respect to self-efficacy, the only significant factor found was the number of cigarettes smoked ( $\beta = -.30, t = -4.15, p < .001$ ) with an explicability of 12% (adjusted  $R^2 = .12, F = 4.13, p < .001$ ) (Table 2). This suggested that participants who smoked fewer cigarettes were more likely to have a higher level of self-efficacy.

Age ( $\beta = .15, t = 2.16, p = .032$ ), smoking cessation education needs ( $\beta = .21, t = 2.95, p = .004$ ), and previous smoking cessation experience ( $\beta = .20, t = 2.78, p = .006$ ) were found to influence perceived social support for smoking cessation with an explicability of 14% (adjusted  $R^2 = .14, F = 4.82, p < .001$ ) (Table 2). This suggested

that older participants, those who smoked fewer cigarettes, and those with previous smoking cessation experience had higher levels of perceived social support for smoking cessation. Smoking cessation education needs were found to be the most influential factor.

Taken together, our findings can be summarized as follows (Figure 2): The significant psychosocial predictors of smoking cessation behavior stage were perceived benefit, barrier, and social support. In addition, smoking duration, previous experience of smoking cessation, and gender were found to be significant predictors of smoking cessation behavior stage. Regarding perceived severity, age, smoking cessation education needs, and smoking-related symptoms were influential factors. For perceived benefits of smoking cessation, age, number of cigarettes smoked, and previous smoking cessation experience were found to be influential factors. In addition, previous smoking cessation experience influenced perceived barrier to smoking cessation behavior significantly, while the number of cigarettes smoked significantly influenced self-efficacy. Age, smoking cessation education needs, and previous smoking cessation experience influenced perceived social support for smoking cessation.

#### Discussion

The present study was undertaken to develop an integrative smoking cessation behavior model by combining highly predictable constructs extracted from previously verified health behavior models (the Health Belief Model, Theory of Reasoned Action, Protection Motivation Theory, the TTM, and the Health Promotion Model). The fitness of the devised hypothetical model was investigated on a cohort of Chinese students studying in Korea.

In the literature, deliberate health-related behaviors such as smoking cessation or exercise, have been investigated most frequently using the TTM (Noar & Zimmerman, 2005). The TTM presents five stages of behavior change (precontemplation, contemplation, preparation, action, & maintenance stage) and identifies 10 strategies that can be used to promote behavior changes. Each stage requires different strategies (i.e., stage-matched strategies). In the present study, we adopted four stages of behavior change (precontemplation, contemplation, action, & maintenance stage). On the other hand, instead of the 10 strategies

of the TTM, our hypothetical model includes five constructs that have been consistently confirmed to be predictors of health behaviors by the Health Belief Model, Theory of Reasoned Action, and Prediction–Motivation Theory (Baranowski, 2005; Dejoy, 1996; Kim et al., 2010; Nigg & Jordan, 2005; Reid & Aiken, 2011). Our model describes behavior changes during stages of smoking cessation and identifies psychosocial factors and demographic and smoking-related characteristics that influence each stage of smoking cessation behavior.

The results obtained showed that 61.2% of participants were in the contemplation stage, 22.3% were in the precontemplation stage, and 16.5% were in the action or maintenance stage. As compared with the results of a study (Ahn, Yeun, Kwon, Chung, & Rye, 2005) on Korean adult smokers (mean age: 52.1 years) living in a rural area, the proportion of our participants in the precontemplation stage was lower (22.3% vs. 42.1%), and the proportion in the contemplation stage was higher (61.2% vs. 24.1%), which implies that our participants were more likely to be preparing to quit smoking. However, the proportion of participants in the action stage was lower than that found by Ahn et al. (16.5% vs. 24.1%). Similar findings were noted by Zhang et al. (2012) among young Chinese adults (18–24 years old). In that study (Zhang et al.), smokers aged 18–24 years were found to have a greater intention (50.5%) of quitting smoking but lower practice rate (7.1%) than those of older age groups. Because their education standards are higher, young adults are well aware of the harmful effects of smoking and of the importance of smoking cessation. However, smoking cessation behavior is a complicated dynamic process involving affection and interpersonal factors in addition to cognition–perception factors, as suggested in the Health Promotion Model (Pender et al., 2011).

Overall, the hypothetical model devised in the present study provided a good fit with the data, with an explicability of 28%, which appeared to be acceptable in psychosocial fields. Ahn et al. (2005) applied the TTM to smoking cessation behavior change among Korean adult smokers living in a rural area and reported an explicability of 33.2%. In this study, demographic and smoking-related characteristics, and 10 strategies/mechanisms were included as model constructs.

In the present study, we found that the significant psychosocial predictors of smoking cessation behavior stage were perceived benefit, barrier, and social support. This implies that participants with a higher level of perceived benefit and social support and a lower level of barrier are more likely to be at the advanced stage of smoking cessation behavior. Previous studies have consistently shown that perceived benefit and barrier influence many other health-related behaviors (Reid & Aiken, 2011). According to the Health Behavior Model, perceived positive aspects must outweigh perceived negative aspects in order to produce significant behavior changes (Noar & Zimmerman, 2005). That is, the perceived benefits of smoking cessation must outweigh perceived barriers to fulfill cessation behavior. The TTM postulates that such potential gains (pros) and losses (cons) are two decisional balance constructs critical for health behavior stage transition (Chang et al., 2005). Therefore, balance between perceived benefits and barriers may be crucial for the progression from not intending (precontemplation stage) to planning or taking action to quit smoking (contemplation or acting stage).

In the present study, social support was also found to be a significant factor of smoking cessation behavior stage. Most health behavior theories, including the Health Belief Model, the Theory of Reasoned Action, the Theory of Planned Behavior, the Social Cognitive Theory, the TTM, and the Health Promotion Model include social support as a significant construct of health behavior performance. These theories define social support as cues from media or

friends (the Health Belief Model), normative beliefs (the Theory of Reasoned Action & the Planned Behavior Theory), or helping relationships (TTM; Noar & Zimmerman, 2005). It has been consistently reported that family, friends, and work colleagues are major sources of social support for health-related behavior (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). According to a study by Yeon et al. (2012), married male smokers are 1.6 times more likely to progress into the preparatory stage of smoking cessation due to family pressure than unmarried male smokers. This implies that family support can exert a significant positive influence on the progression of smoking cessation behavior stage. However, because our participants were international students studying in Korea, they were unable to obtain family support. It is evident that they would benefit from other types of social support.

Although previous studies have consistently shown that perceived severity and self-efficacy influence many types of health-related behavior (Boardman, Catley, Mayo, & Ahluwalia, 2005; Dejoy, 1996), these two were not found to be significant predictors of smoking cessation stage in the present study. This discrepancy might be due to a difference in outcome measures. The present study evaluated the stage of change of the smoking cessation behavior whereas most others measured the degree of practicing health behaviors. Therefore, it can be inferred that there may be different impact factors contributing to the adoption of smoking cessation behavior and the changes in the stage of smoking cessation behavior. Hyland et al. (2004) reported that self-efficacy plays a crucial role at the maintenance stage of smoking cessation behavior. This implies that self-efficacy is a significant impact factor of smoking cessation behavior after quitting smoking for a certain period of time, but has less impact at the stages where the individual has no intention or just the intention to quit smoking but before the actual smoking cessation behavior is initiated.

Of the demographic and smoking-related characteristics examined in the present study, gender, smoking duration, and previous experience of smoking cessation were found to be significant predictors of smoking cessation behavior stage. It was found that male smokers were more likely to be at the advanced stage of smoking cessation behavior than female smokers were. According to a U.S. surgeon general's report (Gaffney et al., 2002), women are more likely to become addicted to nicotine than men are and 30–49% of women smokers aged 18–24 are nicotine addicted. Other studies have shown that women continue to smoke partly due to fear for weight gain during smoking cessation (Oh, 2004). It appears that these characteristics of women smokers inhibit progress through the stages of smoking cessation behavior.

In the present study, participants who had smoked for a shorter period and those with previous smoking cessation experience were found more likely to be at the advanced stage of smoking cessation behavior. Similarly, Ahn et al. (2005) noted that short-term smokers found it easier to quit than long-term smokers did, suggesting that short-term smokers are less addicted to the harmful chemicals in tobacco. In general, smoking cessation education program primarily try to dissuade nonsmoking young adults from taking up the habit (Grimshaw & Stanton, 2006). Our findings suggest that similar efforts should focus on the promotion of smoking cessation among young smokers, because this is likely to be more successful than attempts to persuade older smokers to quit smoking. In addition, Yeon et al. (2012) reported that smokers with previous smoking cessation experience are more likely to progress to the advanced stage of smoking cessation behavior, suggesting that smokers who have failed to quit smoking could be viewed as potential participants of smoking cessation campaigns.

Of the demographic and smoking-related characteristics, gender, age, number of cigarettes smoked, previous smoking cessation experience, smoking-related symptoms, and educational



needs were significant influential factors of psychosocial constructs in the present study. In particular, previous smoking cessation experience was found to have a direct effect on psychosocial constructs. Although the other significant demographic and smoking-related characteristics did not have direct effects on psychosocial constructs, they appeared to have indirect effects via relations with significant psychosocial constructs.

Because the constructs of the hypothetical model devised in the present study were different from those of the TTM, direct comparisons between our results and those of other studies that adopted TTM are difficult. However, similar to the TTM-based models which used 10 cognitive-behavior strategies, our stage model with psychosocial, demographic, and smoking-related factors was also found to have acceptable explicability (28%). Therefore, both psychosocial factors and cognitive-behavior strategies should be included as key components for successful outcomes when developing intervention programs for promoting smoking cessation behavior stage.

The present study is limited by the fact that the information it provides was obtained using a cross sectional study design although smoking cessation behavior needs to be longitudinally evaluated. Further prospective and longitudinal studies are required to document temporal changes in patterns of smoking cessation behavior.

In terms of nursing implications, our findings may provide useful information when developing a smoking cessation intervention/education program; it may also be useful for counseling smoking-related health problems for foreign students studying in Korea. In addition, the significant factors of stages of smoking cessation behavior defined in the present study can be adopted as key predictors to nursing studies on diverse types of health behavior stages in adolescents or young adults with other ethnic backgrounds.

## Conclusion

An integrative model of stages of smoking cessation behavior was developed based on other health behavior models in a cohort of Chinese students studying in Korea. The devised model was found to provide a good fit with data. The significant psychosocial predictors of smoking cessation behavior stage identified were perceived benefit, barrier, and social support. Of the demographic and smoking-related characteristics studied, gender, duration of smoking, and previous smoking cessation experience were found to influence smoking cessation behavior stage. Because our hypothetical model consists of general psychosocial constructs verified in other health behavior model/theories, this model could be adopted to studies for other deliberate health-related behaviors.

## Conflict of Interest

There are no conflicts of interest regarding this manuscript.

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